REMARKS

The amendment to claim 2 is supported by claim 11. The amendment to claim 13 is supported by claim 2. Claims 1, 4, 7-8, 11, and 14-22 have been cancelled. Claims 2 and 13 have been amended. No new matter has been added. Claims 2-3, 5-6, 9-10, and 12-13 are present and active in the application.

Applicants express their gratitude to Examiner Mayekar for the courteous and helpful telephonic interview held with Applicants' representatives on October 20, 2009. During the interview applicants discussed the amendments presented herein.

Entry of the amendment is respectfully requested. No new claims have been added. No new limitations have been presented. Accordingly, no new issues have been raised.

Methods for transferring energy to a precursor material by exposing it to a plasma are known. For example, precursor material may be introduced into a plasma at any point, such as at any point of the arc column, or at the anode. However, the synthesis of materials with controlled surface chemistry by exposing a precursor material to a plasma has not been described.

The present invention makes use of the discovery that stoichiometric-nanostructured materials may be produced by the "active volume" of a plasma. The "active volume" in a plasma is created by introducing an oxidizing gas into the plasma, before the plasma is expanded into a field-free zone, either (1) in a region in close proximity to a zone of charge carrier generation, or (2) in a region of current conduction between field generating elements, including the surface of the field generating elements. The "active volume" is the most reactive part of the plasma and material synthesized in the "active volume" has unique surface chemistry. As now claimed, the stoichiometric-nanostructure material produced is a metal oxide selected from the group consisting of aluminum oxide, zinc oxide, iron oxide, cerium oxide, chromium oxide, antimony tin oxide, mixed rare earth oxides and indium tin oxide.

The rejections of the claims under 35 U.S.C. 103(a) over US 3,644,781 to Sheer et al. (hereinafter Sheer '781) in view of US 4,181,704 to Sheer et al. (hereinafter Sheer '704) are respectfully traversed. Neither Sheer '781 nor Sheer '704 describe recovering a metal oxide selected from the group consisting of aluminum oxide, zinc oxide, iron

oxide, cerium oxide, chromium oxide, antimony tin oxide, mixed rare earth oxides and indium tin oxide.

Sheer '781 describes a method of energizing a fluid medium containing an entrained condensed phase with an arc discharge generated between an anode and a cathode having a conical tip (Abstract). In this method, a fluid medium in the form of a gas is injected at the contraction zone of a plasma jet, located between the conical cathode tip and the plasma column (col. 4, lines 4-13; see Fig. 1), allowing the gas to enter the arc column at a higher rate than injection at the cylinder column boundary of the arc (col. 4, lines 28-37). Sheer '781 describes that a reactive gas, such as nitrogen or hydrogen, may be introduced into this "injection window" (col. 5, lines 63-73). When combined with a consumable carbon or metal anode, hydrocarbons, nitrides, or hydrides may be produced (col. 5, lines 63-73). The reference also describes passing an inert gas, such as argon, and a powdered material, such as a metal or an oxide, through the arc in order to produce fine, spherical particles (col. 6, lines 16-35). Although the use of an oxide is suggested by Sheer '781, such a process is not actually carried out. Finally, Sheer '781 describes a process by which metal oxides are introduced with hydrogen to produce metals, or with ammonia to produce nitrides (col. 9, lines 16-18). Sheer '781 does not describe the use of an oxidizing reactive gas or the recovery of an oxide.

Sheer '704 describes a process for removing sulfurous gas from the emissions of chemical processes (Abstract). In this process, an effluent is produced by entraining a coarse powder of metal oxides in a working gas, such as air, CO and/or H_2, and injecting both into a "high energy transfer zone," such as an electric arc device (col. 3, lines 19-33). This effluent is then injected into a sulfur-containing gas stream (col. 2, lines 40-44). Entrained solids within the effluent combine with the sulfurous gas to produce metal sulfides, sulfites, or sulfates, fixed in the form of solid particles (col. 2, line 40 thru col. 3, line 42). The solid particles are subsequently collected and removed via bag filter, electrostatic precipitator, or similar device (col. 3, lines 33-42). Sheer '704 does not describe recovering a metal oxide; the only products recovered are metal sulfides, sulfites, and sulfates.

As amended, claim 2 includes recovering a stoichiometric-nanostructured material, wherein the stoichiometric-nanostructured material is a metal oxide selected from the group consisting of aluminum oxide, zinc oxide, iron oxide, cerium oxide, chromium oxide, antimony tin oxide, mixed rare earth oxides and indium tin oxide.

Neither Sheer '781 nor Sheer '704 describe recovering a metal oxide selected from the group consisting of aluminum oxide, zinc oxide, iron oxide, cerium oxide, chromium oxide, antimony tin oxide, mixed rare earth oxides and indium tin oxide. In addition, Sheer '781 does not describe the use of an oxidizing reactive gas. Sheer '781 describes using nitrogen or hydrogen in combination with a consumable carbon or metal anode to produce hydrocarbons, nitrides, or hydrides (col. 5, lines 63-73). The reference also describes passing an inert gas and a powdered material through an arc in order to produce fine, spherical particles (col. 6, lines 16-35), as well as passing metal oxides and hydrogen in order to produce metals (col. 9, lines 16-18). Thus, Sheer '781 does not use an oxidizing reactive gas and does not recover an oxide.

Although Sheer '704 mentions using air as a working gas, it produces only sulfides, sulfites, and sulfates, not metal oxides. Additionally, because Sheer '704 is focused on removing sulfurous gas from chemical emissions, there would be no reason to modify Sheer '704 to include the formation or recovery of metal oxides. Therefore, neither reference describes recovering a metal oxide selected from the group consisting of aluminum oxide, zinc oxide, iron oxide, cerium oxide, chromium oxide, antimony tin oxide, mixed rare earth oxides and indium tin oxide.

As amended, claim 13 recites a process to prepare nanostructured materials which includes recovering a stoichiometric-nanostructured material. Claim 13 further recites that this stoichiometric-nanostructured material is an oxide which has a surface chemistry with a zeta potential having an absolute value greater than 20 mV. Neither Sheer '781 nor Sheer '704 describe a stoichiometric-nanostructured material which has a surface chemistry with a zeta potential having an absolute value greater than 20 mV. More generally, neither reference discusses the surface chemistry of the materials produced. Furthermore, as discussed above, neither reference describes the recovery of an oxide. Sheer '781 suggests the *use* of an oxide (col. 6, lines 16-35), but since

such a process is not actually carried out, one of ordinary skill in the art would not know the zeta potential of any oxides produced by the process.

Applicants submit that claims 2 and 13, and claims dependent thereon, are not obvious over Sheer '781 alone or in combination with Sheer '704. Withdrawal of these grounds of rejection is respectfully requested.

CONCLUSION

All of the grounds raised in the present Office Action for rejecting the application are believed to be overcome or rendered moot based on the remarks above. Thus, it is respectfully submitted that all of the presently presented claims are in form for allowance, and such action is requested. Should the Examiner feel a discussion would expedite the prosecution of this application, the Examiner is kindly invited to contact the undersigned at (312) 876-1400.

Respectfully submitted,

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